Key considerations for mobilising financing for Sponge Cities

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Climate Vulnerability Context

- The PRC is one of the world's most water-stressed countries. Per capita water resources are about ¼ of the global average. By 2030, the country will need up to 20% more in total water supply than it did in 2014, with a rapid increase in urban water demand. Water scarcity is exacerbated by climate change which:
  - alters the seasonality of rainfall
  - intensifies extreme precipitation events
  - heightens the risk of urban flooding
  - strains drainage and sewerage infrastructure
  - makes raw sewage bypass treatment plants and contaminates surface water
- The sponge city development will be guided by modeling of surface water, weather patterns, drainage systems, and groundwater.

National Policy

Photo source: [The opportunities and challenges of the sponge city project in Chinese cities – the solution of urban flood and drought issues? – Asia Dialogue (theasiadialogue.com)]

- Enhancing resilience to extreme weather events associated with climate change is an emerging priority for cities in the PRC.
- The PRC launched a national “sponge city” program in 2015.
- All cities have formulated their own sponge city special plan as part of the city master plan by 2016 as requested by MOHURD.

Techniques for climate resilience

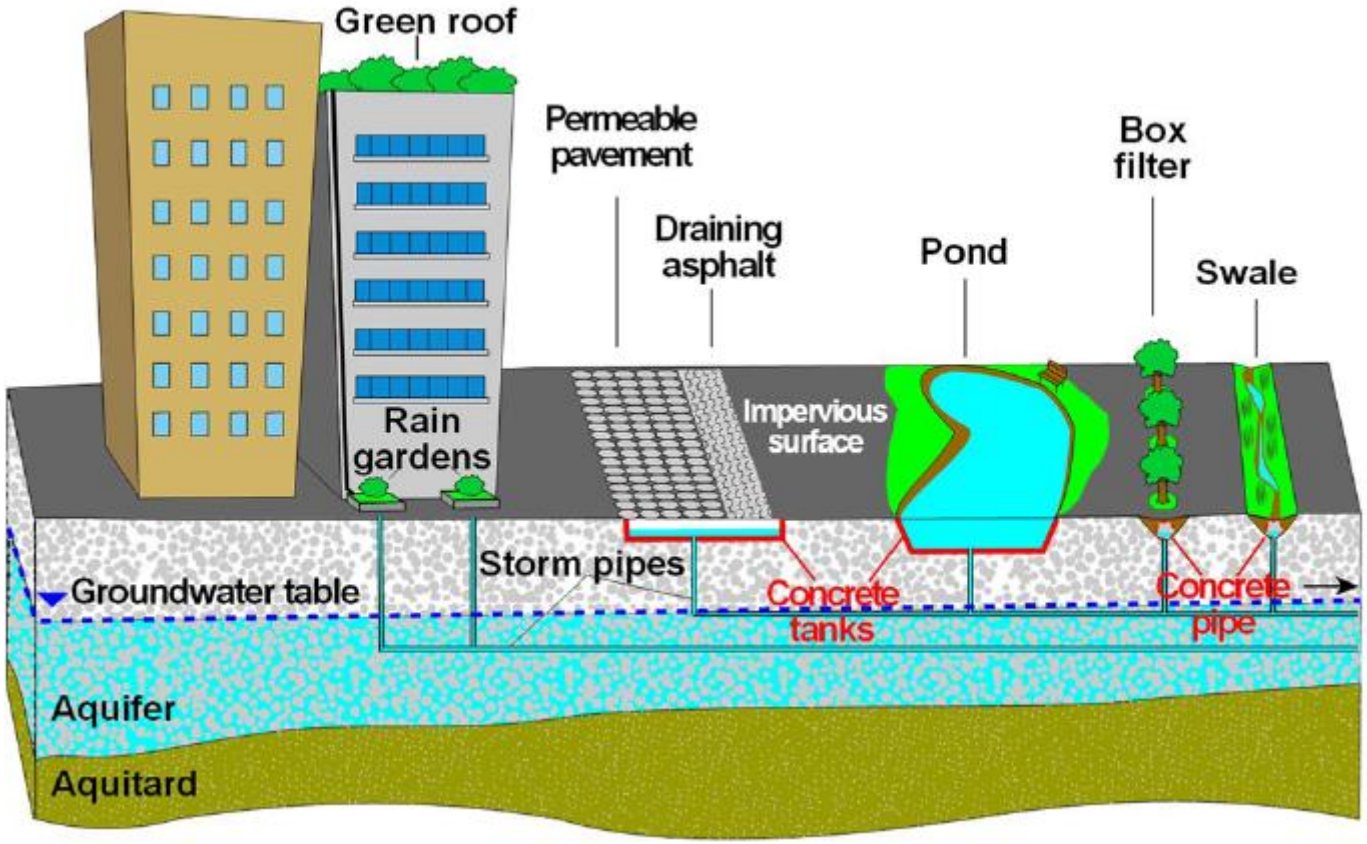


Photo source: M. Lancia, etc. Hydrogeological constraints and opportunities for "Sponge City" development: Shenzhen, southern China.

- Reducing severity of urban flooding caused by excessive rainfall and droughts through storing and releasing runoff in a more ecologically way
- Involving low-impact development techniques such as use of wetlands, permeable pavements, rainwater gardens, green roofs, storage facilities, wastewater reuse, and increased aquifer recharge
- Incorporating early warning systems for floods, weather events, and pollutions

PRC: Climate-Resilient and Smart Urban Water Infrastructure Project

Loan

$200 million equivalent in CNY to support $400 million equivalent in CNY capex in three years

Use of proceeds

Will be channeled into multiple water supply and wastewater treatment subprojects with smart water technologies and climate- and disaster-resilient urban water infrastructure

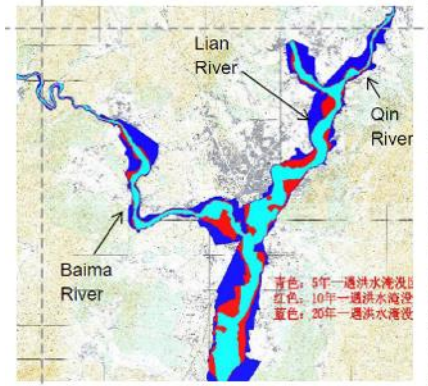
Technical eligibility

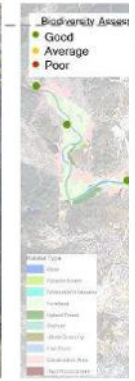
Technical requirements are stipulated in loan agreement as part of eligibility criteria

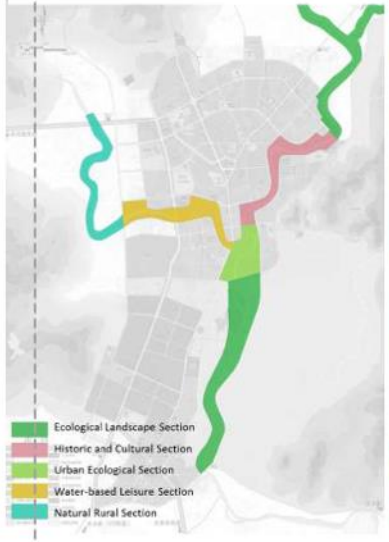
Estimation of adaptation finance

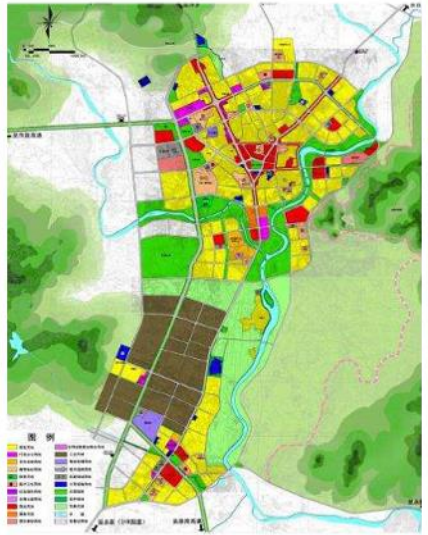
Adaptation finance was estimated at $40 million, representing 20% of ADB financing, or 10% of total project cost

PRC: Jiangxi Pingxiang Integrated Rural-Urban Infrastructure Development Project









The overall objective of sponge cities is to improve the management of the urban water cycle especially through decentralized management of rainwater and stormwater. It also contributes to improved overall water resource management of a city by addressing flooding, water scarcity and pollution. The sponge city concept takes into consideration increased climate variability which leads to extreme flooding and longer dry periods and extreme heat over the year. Stormwater, which may otherwise flood and affect people and urban areas and their assets, is slowed down, and detained to remove its potentially destructive force. Rainwater is filtered and released slowly using green systems, just like a sponge does, and/or stored and reused after storms when less water is available, for landscape irrigation, street cleaning, or other urban uses. ADB projects focus on nature-based solutions. Sponge cities ideally integrate green and gray infrastructure systems to optimize benefits.

PRC: Jilin Yanji Low-Carbon Climate-Resilient Healthy City Project

Integrated Solution to make Yanji more livable

- **ADB Project Loan $130 million equivalent** of $260 million total investment, approved 2019 and currently under implementation
- **First bus rapid transit (BRT) line in the city** Connects major urban functions and areas following ”compact city” and “transit-oriented development” (TOD) principles
- **Improved bicycle and pedestrian networks** and create new small streets and green links
- **Linear green parks as green infrastructure**
- **Improved water supply and wastewater** management.
- **Improved health outcomes, environment and healthy lifestyles** and safe links to schools and hospitals. Health impact assessment and healthy and age-friendly city masterplan during implementation.

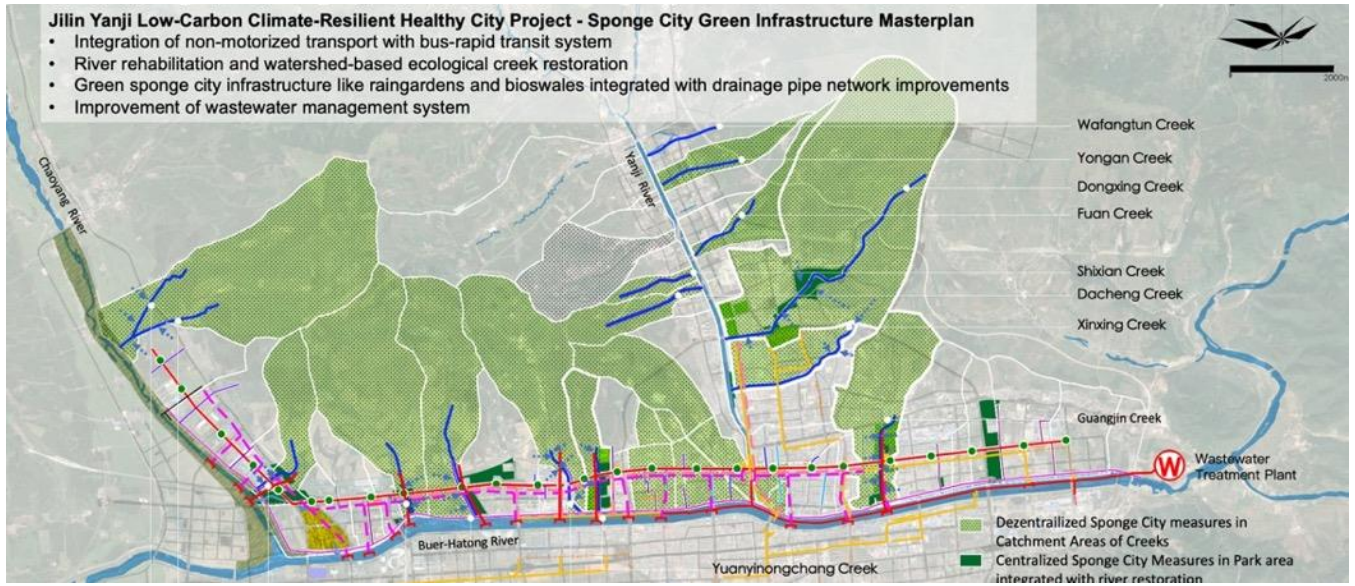
Source: Asian Development Bank Project Documents

PRC: Jilin Yanji Low-Carbon Climate-Resilient Healthy City Project

Improved resilience through integration of gray and green infrastructure, and transport infrastructure

Sponge City Green Infrastructure Masterplan

- Based on watersheds and integrated with BRT line and green space and small street systems.
- Integrates new green infrastructure with improving and changing drainage pipe system
- integrates opportunities of green sponge city infrastructure to reduce urban flooding
- River rehabilitation and flood risk management with green river edges
- Combined these actions will increase resilience and improve protection against urban and river flooding



Source: Asian Development Bank Project Documents

PRC: Jilin Yanji Low-Carbon Climate-Resilient Healthy City Project

Improved resilience through application of advanced design concepts and systems

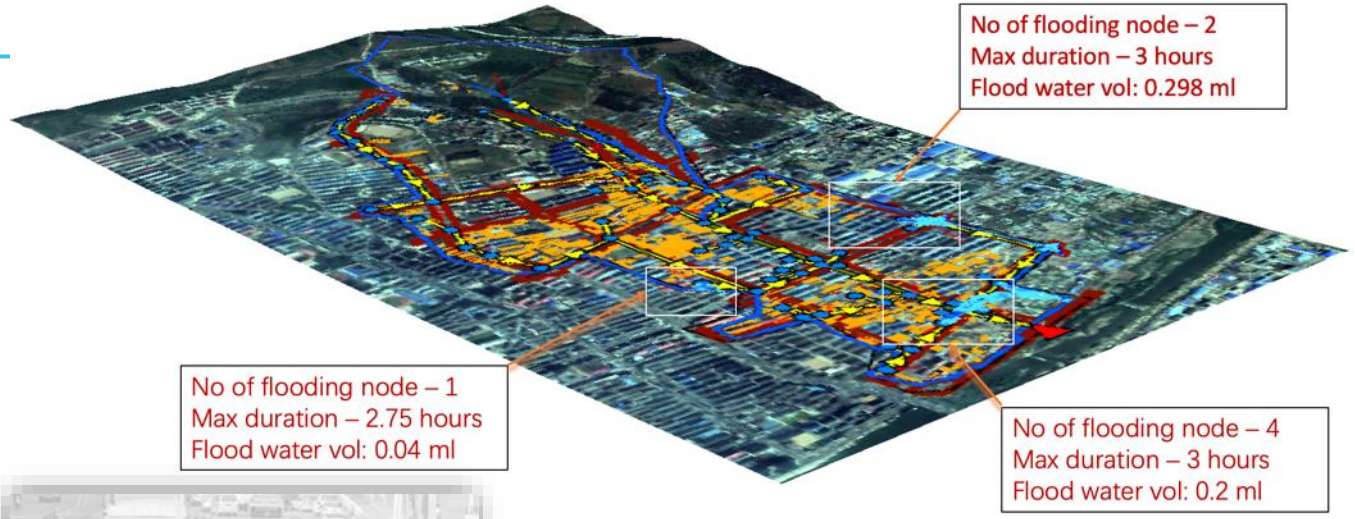
Advanced tools integrating planning & design

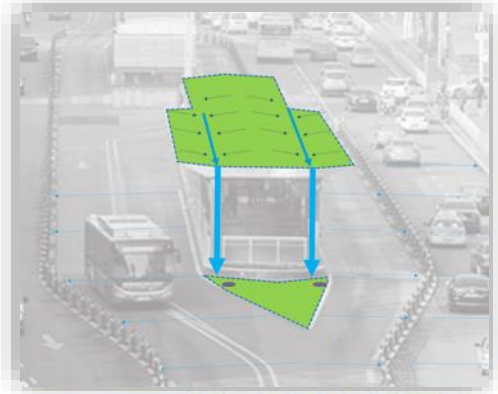
- Systemically integrates gray infrastructure and green sponge city infrastructure to enhance resilience and uses opportunities of integrating transport infrastructure with green sponge city infrastructure

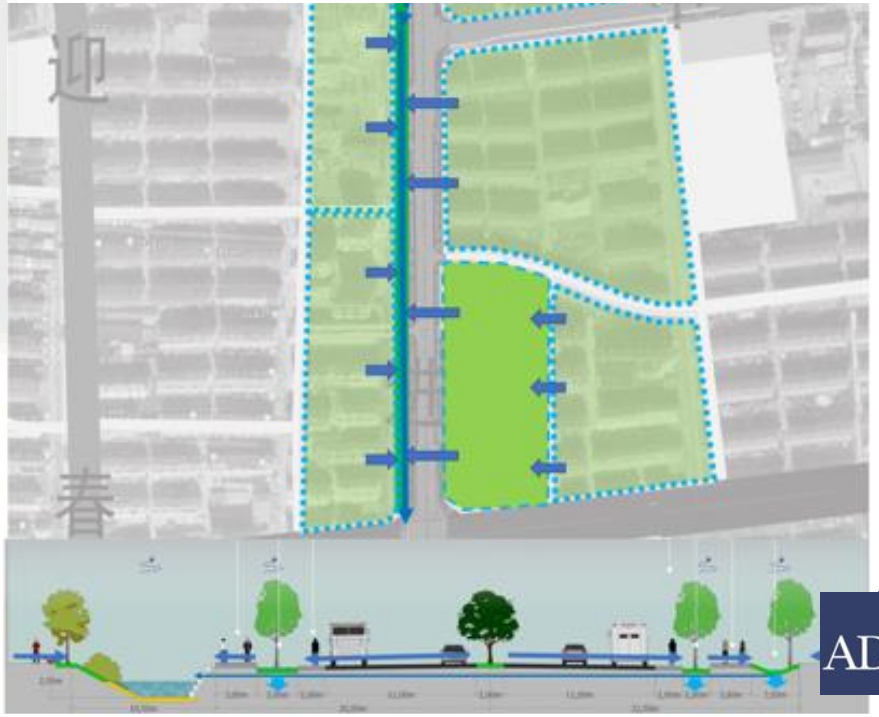
- Integrates a variety of urban and natural functions to optimize planning and design of transport, water supply, drainage and flood risk management and sponge city green infrastructure increasing resilience through ICT systems and user apps

Smart water supply system

- improves resilience, water safety and security, conserving 4.8 million m3 of water resources annually, identifies non-revenue water, smart water meters

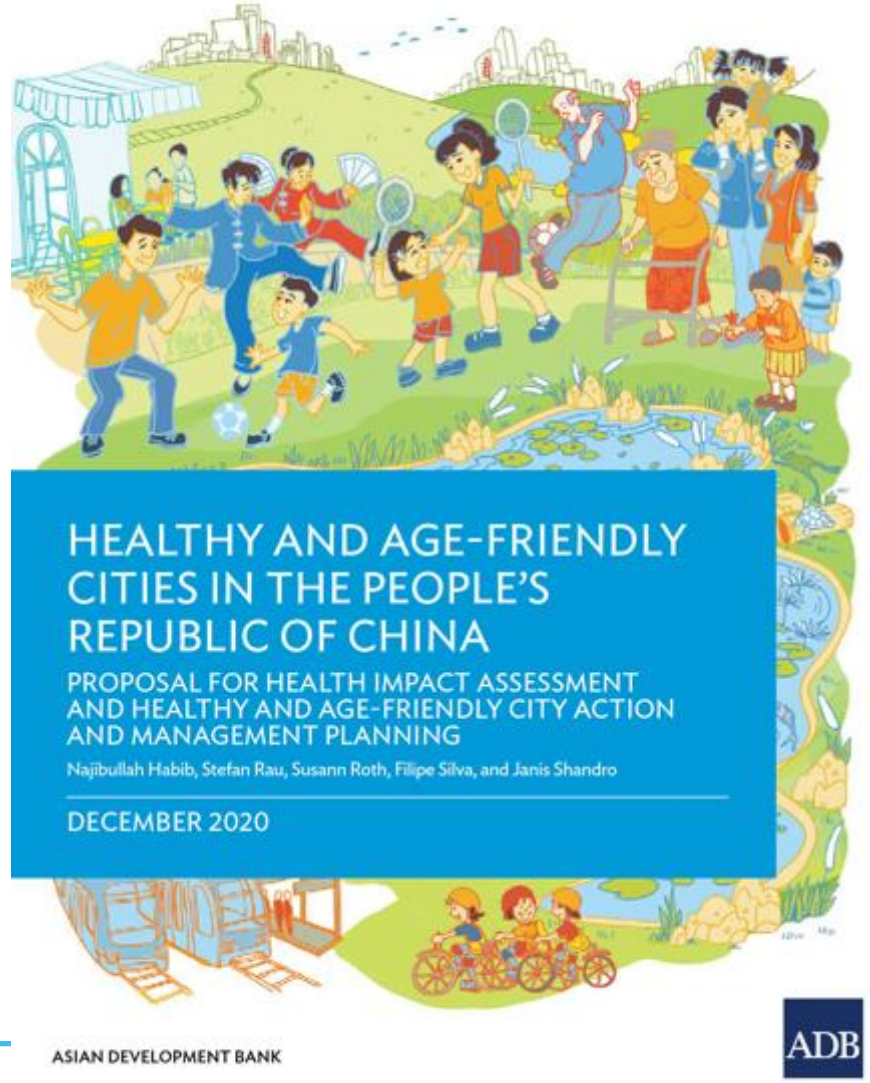


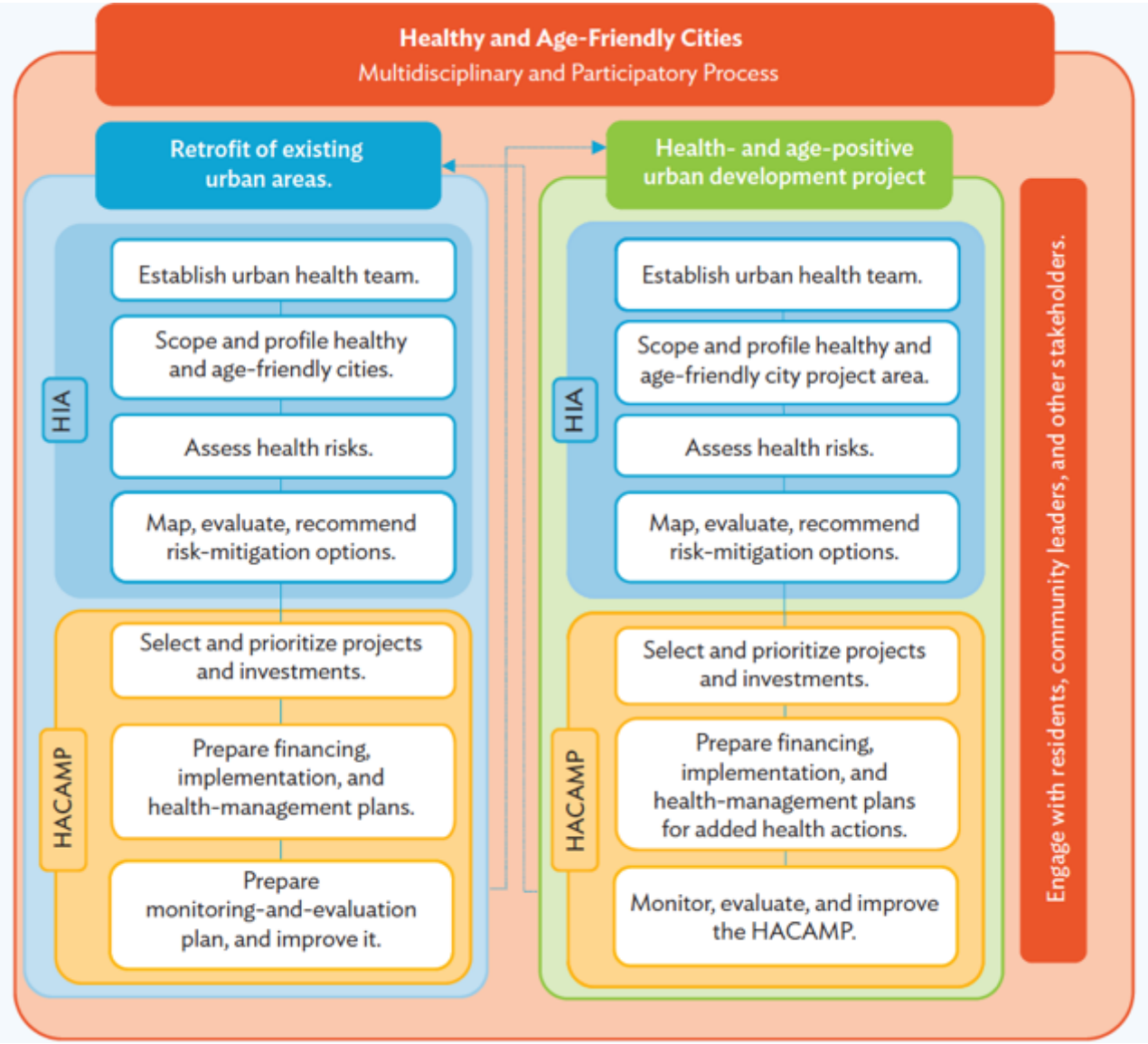




PRC: Jilin Yanji Low-Carbon Climate-Resilient Healthy City Project

HIA: Health Impact Assessment
HACAMP: Healthy and Age-Friendly City Action and Management Plan





ADB

PRC: Hubei Huanggang Urban Environment Improvement Project

Integrated solution to make Huanggang livable – reduce flood risks and improve water quality

- **Huanggang**
  East of Wuhan, along the Yangtze River
  Total population in 2019: 7.37 million
- **ADB Project Loan $100 million** of about $252 million total investment, approved 2014 and currently under implementation
- **Target outcome: Improved urban environment in Huanggang**
  - Reduced return period of seasonal flooding
  - Improved lakes and rivers water quality
- **Project Outputs**
  - Lake and river enhancements with environment facilities operating
  - Solid waste collection and transfer facilities operating and public awareness of solid waste and environmental protection increased
  - Institutional capacity in project implementation and water quality monitor is developed and strengthened

PRC: Hubei Huanggang Urban Environment Improvement Project

Integrated solution to make Huanggang livable – reduce flood risks and improve water quality

NBS approach in flood control and water quality improvement

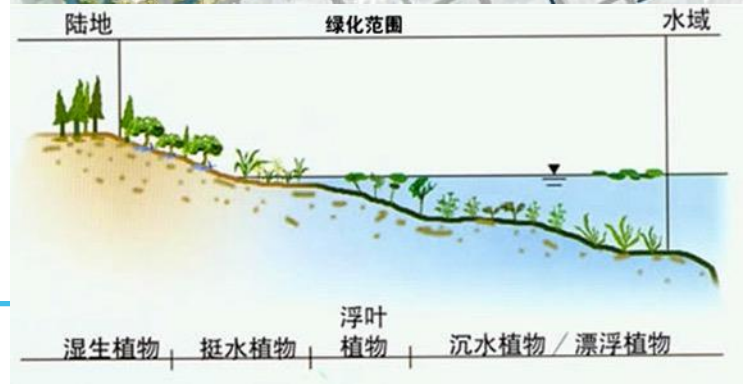
- Ecological flood-retention embankments with vegetated buffer strips
- Create surface-flow constructed wetland in total of 80 hectares Chiye Lake area
- Establish subsurface-flow constructed wetlands to treat nonpoint source pollution
- Ecological measures: aquatic plants, fish species, benthic mollusks
- Install sluice gates and water environment monitoring system
- Enhance water circulation and quality of the entire Xingfu water catchment area
- Install sewer system to separate stormwater and sewage collection in flood-prone river-side communities

Protection of migratory birds

- Yearly water bird survey monitoring program implemented with ornithologist

Herron cluster, Baitan Lake (26 Dec 2020)

Common Kingfisher, Baitan Lake (21 Mar 2021)



PRC: Guangxi Hezhou Environment Restoration and Sustainable Development Project (under preparation for 2021 approval)

Implement nature-friendly measures to reduce pollution in the former mineral mining area

Items	Before	After
Total Engineering cost	CNY 402 million	CNY 135 million
Restoration of damaged ground surface due to mineral mining	The serious topographic and geomorphic landscape destruction points in the area were divided into 10 areas numbered DM01-DM10. Total area 35.5 hectares.	Apply engineering approach on 4 sites only, instead of all 10 sites. Engineering approaches will be applied on 13.1 hectares. Other 6 sites will be naturally restored.
Mine tailings treatment	The proposed mine tailings for excavation was about 500,000 m^3. The design capacity for landfill was 500,000 m^3.	Based on analysis, most tailings are in a stable state, will have very limited hazard on environment. Only tailings (categorized as Class II solid waste) will be excavated and buried, and the tailings amount is only about 44,200 m^3. And the design capacity for landfill is 60,000 m^3.
Water Treatment	The coagulation sedimentation method (lime and flocculant) will be used for the main polluted water system such as Dahu pond and Zhongnan Reservoir.	Physical and biological interception will be used, instead of chemical treatment approach, to reduce the potential impact on the environment Using eco-permeable dikes, eco pollution buffer strips, subsurface-flow wetland at Dahu Pond inlet, water quality monitoring system to prevent polluted water flow into Dahu Pond and Zhongnan Reservoir, etc.